



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/624,763	07/21/2003	Wei Liu	7650/ETCH/SILICON/JB	6504

7590

03/11/2004

Patent Counsel
Applied Materials, Inc.
P.O. Box 450A
Santa Clara, CA 95052

EXAMINER

TOLEDO, FERNANDO L

ART UNIT PAPER NUMBER

2823

DATE MAILED: 03/11/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/624,763

Applicant(s)

LIU, WEI

OK

Examiner

Fernando L. Toledo

Art Unit

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 July 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

2. Claims 1 – 18 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In re claims 1, 7 and 13 have the following limitation: (b) forming a first mask through one or more layers of the multilayer stack.

For examination purposes Examiner assumes that the limitation meant to be read as “forming a first mask by patterning one or more layers of the multilayer stack.”

Claim Rejections - 35 USC § 103

- ~~3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all~~
obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 4, 5, 7, 10, 11, 13, 16 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coane (U. S. patent 4,341,850) in view of Oku et al. (U. S. patent 5,358,885).

In re claims 1, 7 and 13 Coane discloses in the U. S. patent 4,341,850; figures 1a – 2f and related text (a) providing a substrate 10 having a multilayer stack (12, 14 and 16) formed

Art Unit: 2823

thereon; (b) forming a first mask (16a and 14a) through one or more layers of the multilayer stack; (d) etching one or more layers of the multilayer stack to the substrate surface (Figure 2d) (e) filling the opening formed in the multilayer stack with one or more material layers 20; (f) removing the multilayer stack from the substrate leaving therein a feature formed of the one or more material layers (Figure 2f).

Coane does not show (c) forming a second mask on one or more sidewalls of the first mask; (d) using the second mask to form an opening in the multilayer stack.

However, Oku, in the U. S. patent 5,358,885; figures 1 – 5 and related text, discloses forming a second mask on one or more sidewalls of the first mask to form a T-shaped gate structure (Abstract).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to forming a second mask on one or more sidewalls of the first mask in the invention of Coane, since, as taught by Oku, it forms a T-shaped gate structure.

Coane in view of Oku discloses (d) using the second mask to form an opening in the multilayer stack.

5. In re claims 4, 10 and 16 Coane in view of Oku discloses (c1) depositing a second mask layer conformably on the first mask (Figure 2e of Oku); and (c2) etching portions of the second mask layer on horizontal surfaces of the substrate leaving the second mask layer on one or more sidewalls of the first mask (Figure 2f of Oku).

6. In re claim 5, 11 and 17 Coane in view of Oku discloses wherein the second mask includes a material selected from the group consisting of silicon dioxide and silicon nitride (Column 5; Lines 48 and 49 of Oku).

Art Unit: 2823

7. Claims 2, 3, 6, 8, 9, 12, 14, 15 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coane in view of Oku as applied to claims 1, 4, 5, 7, 10, 11, 13, 16 and 17 above, and further in view of Yang et al. (U. S. patent 6,551,941 B2).

In re claims 2, 8 and 14, Coane in view of Oku does not show wherein step (b) further includes: (b1) forming a photoresist pattern on the multilayer stack; (b2) transferring the photoresist pattern through one or more layers of the multilayer stack; and (b3) removing the photoresist pattern from the multilayer stack.

However, Yang, in the U. S. patent 6,551,941 B2; figures 1A – 9 and related text discloses (b1) forming a photoresist pattern on the multilayer stack; (b2) transferring the photoresist pattern through one or more layers of the multilayer stack; and (b3) removing the photoresist pattern from the multilayer stack (Column 9; Lines 34 – 48 and Figure 2F) because it is a typical process for forming such an etch stack (Column 9; Lines 24 – 27).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to (b1) form a photoresist pattern on the multilayer stack; (b2) transfer the photoresist pattern through one or more layers of the multilayer stack; and (b3) remove the photoresist pattern from the multilayer stack, in the invention of Coane in view of Oku, since, as taught by Yang, it is a typical process for forming such an etch stack.

8. In re claims 3, 9 and 15, Coane and Oku in view of Yang disclose wherein the first mask includes at least one of a dielectric antireflective coating (DARC) and an amorphous carbon layer (206 of Yang).

Art Unit: 2823

9. In re claims 6, 12, and 18, Coane and Oku in view of Yang disclose wherein the one or more material layers filling the opening in the multilayer stack include polysilicon (204 of Yang).

Conclusion

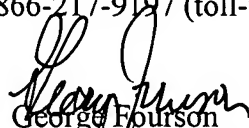
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Fernando L. Toledo whose telephone number is 571-272-2187. The examiner can normally be reached on Mon-Fri 8am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on 571-272-1855. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



FToledo
4 March 2004



George Fourson
Primary Examiner
Art Unit 2823